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Ethnic diversity and economic growth in China

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We investigate the effects of ethnic diversity on economic growth in the People's Republic of China. Based on provincial data from 1982 to 2007, we find a negative relationship between ethnic diversity and economic growth across Chinese provinces supporting existing cross-country studies such as Alesina *et al*. (2003). According to our estimations, going from complete ethnic homogeneity to complete ethnic heterogeneity reduces the growth rate between 2 percentage points and 2.5 percentage points in China, depending on the ethnic diversity index used.

Keywords: ethnic diversity; economic growth; China

1. Introduction

Although the Han make up the vast majority of China's total population, China is a very diverse country ethnically. There are 56 officially recognized ethnic groups in China and the Han are a minority in most of the provinces in western China. Among the 55 ethnic groups other than the Han, 44 occupy their own autonomous regions, or counties through their *Minority Autonomous Status* such as Inner Mongolia Autonomous Region, Guangxi Zhuang Autonomous Region, Tibet Autonomous Region, Ningxia Hui Autonomous Region, and Xingjian Uygur Autonomous Region. The largest ethnic minority groups in China are the Zhuang at 16 million, the Manchu at 10 million, the Hui at 9 million, the Miao at 8 million, the Uyghurs at 7 million, the Yi at 7 million, the Tujia at 5.75 million, the Mongols at 5 million, the Tibetan at 5 million, the Buyei at 3 million, and the Koreans at 2 million. The degree of integration of ethnic minorities with each other and with the majority Han varies significantly from group to group. The emperors of the Qing Dynasty, for example, were themselves Manchu not members of the Han majority.

As mentioned above, apart from its eastern coastal areas, the rest of China is significantly ethnically diverse. According to the two diversity indices that we use in our study, inland western China is about four times as ethnically diverse as its coastal eastern counterpart. The ethnic fractionalization and polarization indices (*EFI* and *EPI* henceforth) for coastal China are 0.05 and 0.10, respectively while for inland China they are 0.25 and 0.40, respectively. The high level of ethnic diversity in inland China is partly due to the fact that the five ethnic autonomous provinces are all located in the west. Nevertheless, other provinces in the west are also very ethnically diversified. Yunnan, for example, has the highest number of ethnic groups among all provinces and autonomous regions in China. Among China's 56 ethnic groups, 25 are located in Yunnan. Almost 40% of the province's population belongs to different minority groups. Guizhou is another highly ethnically diverse province in the region. The minority groups in the province account for more than 35% of

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the population. Qinghai, another inland province, is the most ethnically diverse province in China except for the five ethnic autonomous regions. Its *EFI* and *EPI* are 0.602 and 0.777 respectively.

During the last 30 years, China experienced some of the fastest economic growth in the world. However, as Fleisher and Chen (1997) argue, the average growth rate for coastal provinces was much higher than the growth rate for inland provinces. The coast/inland ratio of mean GDP per capita grew by more than 10%, from the late 1970s to mid-1990s. The income inequality between the rich eastern coastal region and the poor western inland region, which is home to 80% of minorities in China, rose continuously over time. Today, a big majority of some 40 million people living under poverty are located in western China.

Why are some provinces rich and others poor? Several studies, such as Bao *et al*. (2002), Demurger (2001) and Fleisher and Chen (1997) investigate the factors affecting regional income inequality in China. Among the long list of factors, Bao *et al*. (2002), for example, focus on geographical differences. They argue that coastal regions have topographic advantages. Demurger (2001), on the other hand, argues that the availability of an appropriate infrastructure is likely to compensate for these differences. According to Fleisher and Chen (1997), low factor productivity in inland provinces explains slow economic growth. They find that total factor productivity is roughly twice as high in the coastal provinces and they argue that investment in higher education and foreign direct investment helps explain the productivity differences between inland and coastal provinces. In our opinion, ethnic diversity is as important as the other factors such as infrastructure in explaining regional income inequality in China. Although China is an ethnically diverse country, the effects of ethnic diversity on economic growth are largely overlooked in all of these aforementioned studies. Quite a few studies, such as Alesina *et al*. (2003) find a negative relationship between ethnic diversity and economic growth across countries.

In this study, we investigate the effects of ethnic diversity on economic growth across Chinese provinces. According to our seemingly unrelated regression (SUR) estimations, going from complete ethnic homogeneity to complete ethnic heterogeneity reduces the growth rate between 2 percentage points and 2.5 percentage points in China depending on the ethnic diversity index used. The study is organized as follows. In Section 2, we give a short review of the related literature. We summarize the data on ethnic diversity, as well as on control variables, in Section 3. In Section 4, we present our model and estimation results regarding relationships between ethnic diversity and economic growth. Robustness is discussed in Section 5. In Section 6, we consider the contribution of our paper and discuss the implications of our findings.

2. Literature review

Several empirical studies, based on cross-country regressions, such as Easterly and Levine (1997), Alesina *et al*. (2003) and Montalvo and Reynal-Querol (2005), show that ethnic diversity generates conflicts that lead to poor quality of institutions, poorly designed policies and poor growth performances. Alesina *et al*. (2003), for example, find that up to almost 2 percentage points of the difference in annual growth rate of income between South Korea and Uganda is explained by different degrees of ethnic diversity. Easterly and Levine (1997) find that ethnic diversity alone accounts for almost 28% of the income growth differential between the countries of Africa and East Asia. Both Easterly and Levine (1997)

and Alesina *et al*. (2003) measure diversity by using a fractionalization index (*FI*) calculated as

$$FI_i = 1 - \sum_{j=1}^{J} n_{ij}^2$$

where n_{ij} is the population share of group *j* in country *i*. The fractionalization index gives us the probability that two randomly selected individuals in a country belong to two different ethnic or religious groups. It reaches a maximum if every individual in a country belongs to a different ethnic or religious group. According to Montalvo and Reynal-Querol (2005), on the other hand, ethnic fractionalization does not necessarily cause conflict: we are, in fact, less likely to observe conflict in highly homogeneous and highly heterogeneous states; an increase in diversity, after some point, decreases the likelihood of conflict. Montalvo and Reynal-Querol (2005) use a polarization index (*PI*) to measure diversity:

$$PI_i = 1 - \sum_{j=1}^{J} \left(\frac{0.5 - n_{ij}}{0.5} \right)^2 n_{ij}$$

PI is an index that measures the distance of any distribution of ethnic and religious groups from the situation that leads to the maximum conflict. The closer is the distribution of religious and ethnic groups in a country the higher is the *PI*. In contrast to *FI*, *PI* reaches a maximum when there are two religious or ethnic groups of equal size in a country.[1] As Alesina *et al*. (2003) argue, the degree of polarization increases as the distance between groups increases. Nevertheless, when it comes to ethnic groups, calculating the distance between different ethnic groups is a very difficult task. Montalvo and Reynal-Querol (2005) assume that the distance between any two ethnic groups is equal. Since distances are assumed to be equal among all groups, the degree of polarization only depends on the size of the groups. They find that going from complete ethnic homogeneity to complete heterogeneity decreases the growth rate of income by almost 1 percentage point.

Ethnic diversity affects economic growth via several channels. First, ethnic diversity reduces institutional quality and raises corruption (Treisman, 2000; Glaeser and Saks, 2006). According to van den Berghe (1987) and Vanhanen (1999), the members of an ethnic group display ethnocentric behavior by favoring their group members over non-members. As Glaeser and Saks (2006) argue, if there are a number of ethnic groups in a society and the politicians/bureaucrats tend to allocate resources towards backers of their own ethnicity, then members of one ethnic group are likely to continue to support a politician/bureaucrat of their own ethnic group, even if he or she is known to be corrupt. Second, ethnic diversity reduces social capital and trust. According to Delhey and Newton (2005), people have a tendency to associate with, socialize with, and be more comfortable with people who appear similar to themselves. Using cross-country data, Delhey and Newton (2005) find a negative relationship between ethnic diversity and trust as do Alesina and La Ferrara (2002) using US data. Several studies find a negative relationship between corruption and economic growth and a positive relationship between trust and economic growth (Mauro, 1995; Glaeser and Saks, 2006; Knack and Keefer, 1997; Dincer and Uslaner 2010).

3. Data

Following the literature, we use ethnic fractionalization and polarization indices to measure ethnic diversity. We calculate *EFI* and *EPI* using data from China National Population Censuses for 1982, 1990 and 2000, which cover all 56 ethnic groups for all provinces in mainland China. For consistency, we combine Hainan with Guangdong and Chongqing with Sichuan as they were not independent provinces until 1988 and 1997, respectively. We also exclude Tibet and Shaanxi due to missing data. The size of the ethnic groups in China varies significantly and they are not evenly distributed across the country. The largest group, the Hans, account for around 90% of the total population, and there are only a few thousand people belonging to the smallest group, the Monbas, out of more than 1.3 billion people in China. The ethnic groups other than the Hans are largely distributed in relatively low growth inland provinces, particularly in Qinghai and Xinjiang. The *EFI* (*EPI*) is equal to 0.62 (0.86) in Xinjiang and 0.60 (0.78) in Qinghai. Jiangxi is the most ethnically homogeneous province. Taking the fractionalization index first, based on the averages across three years, average *EFI* is equal to 0.05 in coastal provinces, while it is equal to 0.25 in inland provinces. Turning to the polarization index, the average *EPI* is equal to 0.10 and 0.40 in the coastal and inland provinces, respectively. The relationship between the ethnic fractionalization index and the ethnic polarization index is positive and close to linear when the level of fractionalization is low. However, for the medium levels the correlation is nearly zero.[2]

We use data from China Statistical Yearbook and China Compendium of Statistics to calculate our dependent variable, the average real provincial per capita GDP growth rates for the periods 1982–1990, 1990–2000, and 2000–2007.

We also include a set of control variables in our regressions to minimize the omitted variable bias. First, along with a dummy variable (*Coast*) for the coastal provinces including Beijing, we include a control variable for initial real per capita GDP (*InitialGDP*). Second we control for investment in physical and human capital. We measure physical capital (*Capital)* as the share of gross fixed capital formation (percentage of GDP) and human capital (*Education*) as the share of population with at least a senior high school degree.[3] Third, we control for openness (*Trade*). According to Chen and Feng (2000) and Brun *et al*. (2002), openness to international trade is one of the most important factors in China's fast economic growth. We measure openness of a province as per capita volume of trade (exports plus imports) in US dollars. Following Demurger (2001), Fleisher and Chen (1997), and Fan and Zhang (2004) we also control for infrastructure. Demurger (2001) argues that good infrastructure causes trade to increase and hence causes the economy to grow. We measure infrastructure as the transportation and telecommunication share of GDP (*Infrastructure*). Fifth, we control for the sizes of the state-owned enterprises (*SOEs*) and the township and village enterprises (*TVEs*). Both *SOEs* and *TVEs* play a major role in the Chinese economy. Nevertheless, as Chen and Feng (2000) argue, most of the *SOE*s perform poorly due to their lack of adaptability to changing market conditions. *TVEs*, on the other hand, are more efficient in production compared with the *SOEs* (Fu and Balasubramanyam, 2003). We measure the size of the *SOEs* and the *TVEs* in the economy as their share of employment in total employment. Finally, following Demurger (2001) we control for the share of agriculture in GDP (*Agriculture*). According to Demurger (2001), agricultural provinces have fewer opportunities for productivity growth than industrial provinces and hence grow slower. We use the initial values of *EPI*, *EFI*, and all of our control variables in our regressions. We use data from China National Population Censuses to calculate our diversity indices and our education variable. The data for

the rest of the variables are from China Statistical Yearbooks and China Compendium of Statistics.

4. Results

We estimate the following growth equation by seemingly unrelated regression (SUR) for 27 Chinese provinces for the periods 1982–1990 (period 1), 1990–2000 (period 2), and 2000–2007 (period 3):

$$GDP\ Growth_i = Intercept + \beta_1 \ln Initial GDP_i + \beta_2\ EFI_i\ (\text{or } EPI_i) + \beta_3\ X_i + u_i$$

where $GDP\ Growth_i$ represents the growth rate of GDP in province i during each period. *EFI* and *EPI* represent the ethnic and fractionalization and polarization indices and X represents the set of control variables that affect economic growth including the coast dummy (*Capital*, *Education*, *Trade*, *Infrastructure*, *SOEs*, *TVEs*, and *Agriculture*). SUR is a flexible form of Random Effects (RE) estimation and is widely used in cross-country growth regressions since it allows for the error terms to be correlated across periods (Alesina and La Ferrara, 2005). We first formulate a separate regression for each period, then constrain the coefficients to be equal across periods and estimate the resulting system by generalized least squares (GLS). If the error terms are not correlated, there is no payoff to GLS estimation. GLS is then simply equation-by-equation ordinary least squares (OLS). The greater the correlation of the error terms, the greater the efficiency gain accruing to GLS (Greene, 2003).[4]

The results of the SUR estimation for individual effects of *EFI* and *EPI* on provincial growth are given in Tables 1 and 2. The estimated coefficients of both *EFI* and *EPI* are negative and statistically significant at the 1% and 5% levels all the time, which indicates a strong negative relationship between ethnic diversity and economic growth. The results of our SUR estimation suggest that going from complete homogeneity to complete fractionalization (*EFI*=1) decreases the growth rate of real per capita GDP by almost 2.5 percentage points, while going from complete homogeneity to complete polarization (*EPI*=1) decreases the growth rate by almost 2 percentage points. Comparing two individual provinces, Qinghai and Inner Mongolia for example, helps us put our findings in perspective. Both provinces are located in inland China and share similar economic characteristics. However, the growth rate of Inner Mongolia (11.5%) is the highest over the sample periods we have while the growth rate of Qinghai (8.5%) is one of the lowest. Two provinces differ significantly in terms of ethnicity. *EFI* and *EPI* are 0.31 and 0.57 in Inner Mongolia, respectively, while in Qinghai they are 0.60 and 0.78. Up to 0.7 percentage points of the difference in growth rates (25% of the difference) between Inner Mongolia and Qinghai is explained by the different degrees of ethnic fractionalization in those provinces and up to 0.4 percentage points (14% of the difference) by different degrees of ethnic polarization.

The estimated coefficients of the control variables are mostly consistent with the earlier studies. The estimated coefficient of ln(*Initial GDP*) is negative and highly significant, thus indicating convergence between provinces in China. *Capital* has a positive and significant effect on growth as does *Education*. The estimated coefficient of *Infrastructure* is positive and significant (Demurger, 2001; Fleisher and Chen, 1997; and Fan and Zhang, 2004). As Demurger (2001) argues, considering China's huge size, important regional differences arise naturally in geography and in natural resource endowments. To compensate for these natural constraints, the availability of an appropriate infrastructure helps in facilitating

Table 1. Ethnic fractionalization and growth.

	Growth			Growth		
Intercept for the 1980s	0.190	(0.030)***		0.159	(0.056)***	
Intercept for the 1990s	0.235	(0.032)***		0.188	(0.058)***	
Intercept for the 2000s	0.298	(0.037)***		0.246	(0.064)***	
ln *Initial GDP*	−0.022	(0.005)***		−0.032	(0.009)***	
EFI	−0.024	(0.009)***		−0.025	(0.008)***	
Education				0.102	(0.058)**	
Capital				0.103	(0.019)***	
ln *Trade*				0.007	(0.003)***	
Infrastructure				0.366	(0.120)***	
SOEs				−0.059	(−0.033)**	
TVEs				0.155	(0.063)***	
Agriculture				0.094	(0.025)***	
Coast	0.024	(0.005)***		0.014	(0.006)***	
Observation	27,27,27			27,27,27		
R-squared	0.12,0.50,−0.06			0.58,0.48,0.29		
Correlation Matrix of Residuals	Growth80s	Growth90s	Growth2000s	Growth80s	Growth90s	Growth2000s
Growth80s	1.00			1.00		
Growth90s	−0.41	1.00		−0.63	1.00	
Growth2000s	0.20	−0.34	1.00	0.36	−0.47	1.00
Breush-Pagan test of Independence	Chi2(3)=8.783	Pr=0.0323		Chi2(3)=20.226	Pr=0.000	

Standard errors in parentheses. All tests are one tailed. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 2. Ethnic polarization and growth.

	GDP growth			GDP growth		
Intercept for the 1980s	0.198	(0.031)***		0.201	(0.056)***	
Intercept for the 1990s	0.244	(0.033)***		0.231	(0.058)***	
Intercept for the 2000s	0.307	(0.037)***		0.294	(0.064)***	
ln *Initial GDP*	−0.023	(0.005)***		−0.039	(0.008)***	
EPI	−0.012	(0.006)**		−0.019	(0.006)***	
Education				0.099	(0.056)**	
Capital				0.106	(0.020)***	
ln *Trade*				0.008	(0.003)***	
Infrastructure				0.369	(0.126)***	
SOEs				−0.045	(−0.032)*	
TVEs				0.147	(0.059)**	
Agriculture				0.089	(0.025)***	
Coast	0.025	(0.005)***		0.014	(0.006)***	
Observation	27,27,27			27,27,27		
R-squared	0.20,0.44,−0.05			0.61,0.47,0.29		
Correlation Matrix of Residuals	Growth1980s	Growth1990s	Growth2000s	Growth1980s	Growth1990s	Growth2000s
Growth1980s	1.00			1.00		
Growth1990s	−0.41	1.00		−0.64	1.00	
Growth2000s	0.17	−0.26	1.00	0.39	−0.35	1.00
Breush-Pagan test of Independence	Chi2(3)=7.180	Pr=0.066		Chi2(3)=18.446	Pr=0.000	

Standard errors in parentheses. All tests are one tailed. * significant at 10%; ** significant at 5%; *** significant at 1%.

communication between provinces and with the world (Demurger, 2001, p. 96). There is a positive relationship between openness and growth (Chen and Feng, 2000, and Brun *et al*., 2002). The estimated coefficient of *Agriculture* is positive and significant, which is not consistent with Demurger's (2001) findings. Demurger (2001) finds a negative relationship between the share of agriculture and economic growth. We believe the positive coefficient is due to the sustained growth in agricultural production since the early 1980s. Economic reforms of 1978 started in agriculture before expanding to the manufacturing. According to Lin (1988), the household responsibility system that replaced the production team system as the unit of production brought about dramatic changes in rural China. This institutional change resulted in significant growth in agricultural productivity. Supporting Chen and Feng (2000) and Fu and Balasubramanyam (2003), we find a negative relationship between *SOEs* and economic growth and a positive relationship between *TVEs* and economic growth.

5. Robustness of the results

The first robustness issue is related to the endogeneity of ethnic diversity, i.e. the endogeneity of fractionalization and polarization indices as they are likely to change through time. As Alesina *et al*. (2003) argue, ethnic fractionalization and polarization indices are generally taken as exogenous in cross-country regressions. This seems a reasonable assumption for the typical cross-country regression covering, for example, 30 years – not a long period of time (Alesina *et al*. 2003, p. 162). We, on the other hand, are estimating cross-province regressions. Migration across provinces is likely to be higher than across countries. In fact, especially after the 1980s, the coastal provinces attracted millions of migrants. Nevertheless, this is not likely to be enough to change the ethnic composition of the provinces. China is one of the biggest countries in the world with a vast land area of 9.6 million km^2 and with more than 1.3 billion population. Hence, a time period of 10 years is definitely not long enough to change the demographic composition of a province significantly. In fact, the correlation coefficients of *EFI* and *EPI* between 1982, 1990 and 2000 are very close to 1.[5] In addition, we use data from the beginning of our periods. If we were using diversity data from the end of our periods, major shifts in the share of ethnic groups in a province could have led to an endogeneity bias in our regressions.

The second robustness issue is related to the measurement of ethnic diversity as ethnic classifications are not that easy to determine. The data that we use to calculate the fractionalization and polarization indices in this study are based on race. We do not have, for example, data on language. We are classifying all the Hans, for example, in the same group, although it is possible to classify them into quite a few different linguistic groups, such as Wu, Min, Hakka, and Cantonese. On the other hand, the data on linguistic groups for individual provinces are not available.

6. Conclusion

Growing regional income inequality in China is among the most challenging questions in economic literature. To our knowledge, this is the first study focusing on the effects of ethnic diversity on economic growth across Chinese provinces. While ethnic diversity does not fully account for the growth differentials among the coastal and inland provinces in China, the high level of ethnic diversity in inland China nevertheless appears to be an important factor. The results of our SUR estimation suggest that going from complete homogeneity to complete fractionalization (*EFI*=1) decreases the growth rate real per capita

GDP by almost 2.5 percentage points, while going from complete homogeneity to complete polarization (*EPI*=1) decreases the growth rate by almost 2 percentage points. These results support the earlier studies such as Easterly and Levine (1997), Alesina *et al*. (2003) and Montalvo and Reynal-Querol (2005). Nevertheless, this does not mean ethnic diversity is a curse on growth. Ethnic diversity affects growth negatively if there is conflict among different ethnic groups. Bluedorn (2001) finds that democracy is quite effective at managing ethnic conflict and it is likely to ameliorate the negative effects of diversity on growth. In fact, as Alesina and La Ferrara (2005) argue, diversity is even beneficial in democratic countries such as the United States. It is likely to enter into the production function in such a way that different ethnic groups have different productive skills that complement each other. There are, in fact, some studies investigating the effects of diversity on growth using US cities and US counties, such as Glaeser *et al*. (1995) and Alesina and La Ferrara (2005). None of these studies finds a negative relationship between ethnic diversity and growth.

Our study suffers from a number of limitations, mainly due to data deficiencies. Nevertheless, we believe our results at least suggest that a deeper analysis of the following questions is worthwhile. Is China going to be able to exploit the benefits of having a significant number of different ethnic groups and become an economically successful melting pot such as the US? Is democracy going to be a policy choice during the process?

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Notes

1. For example, in a country with three ethnic or religious groups distributed with percentages 45, 45 and 10, the index and hence the likelihood of conflict is higher than with the percentages 34, 33 and 33 or with 90, 10, 0.
2. Montalvo and Reynal-Querol (2005) find a negative correlation between EFI and EPI for high levels of EFI. We do not find that in our data since there are only five provinces in which EFI is higher than 0.5 and the highest EFI in our data is 0.63.
3. It is a legal requirement for people to receive at least a junior high school diploma in China.
4. In our regressions, both the correlation matrix of residuals and the Breush-Pagan test of independence show that the error terms are indeed highly correlated over our sample periods.
5. This is, of course, partly due to the fact that a big part of this migration was temporary. After the introduction of the household registration system in 1950s, migration became classified as permanent only if the household registration was formally transferred to the new location. Most of these migrants did not change their household registration location. To be counted at a particular location in China's census requires official household registration at that location, being a resident there for one year or more with a household registration elsewhere, or being a resident there for less than one year but being away from the household registration location for more than one year (Goodkind and West, 2002; Li and Zahniser, 2002). In other words, most of these migrants were counted in their original locations in the 1982, 1990 and 2000 censuses.

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